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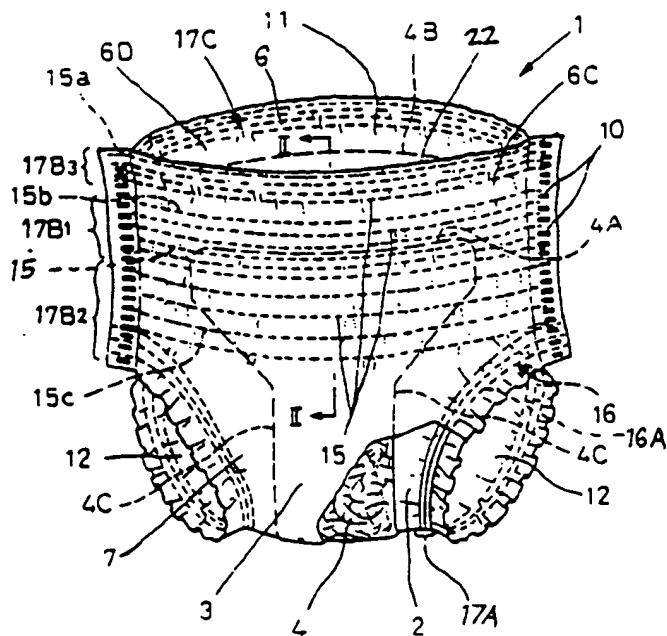
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### (54) Disposable absorbent undergarment of pants type

(57) In a diaper (1) as one embodiment of a disposable absorbent undergarment according to the invention, the diaper (1) is provided around a front region (5) thereof with a plurality of elastic elements (15a, 15b, 15c). The number of the elastic elements (15b) arranged in an area defined by respective depths or vertical

widths of 10mm above and below a front edge (4A) of an absorbent core (4) disposed between top- and back-sheets (2, 3) is greater than that of the elastic elements (15a, 15c) in the remaining area of the front region (15). An elongation stress of the elastic elements (15b) in the former area is lower than that of the elastic elements (15a, 15c) in the latter area...



## Description

The present invention relates to disposable absorbent undergarments of pants type such as disposable diapers of pants type for babies, incontinent pants, training pants for babies and the like.

In conventional absorbent undergarments of pants type, a waist-opening and a pair of leg-openings are usually provided with respective elastic members and thereby the respective opening edges are provided with a desired stretchability in their circumferential direction. Additionally, the elastic elements associated with the waist-opening are usually arranged over a considerably large region defined between an edge of the waist-opening and a crotch region extending between the waist-opening and leg-openings so as to exert a pressure upon a location of the undergarment overlying a liquid-absorbent core from the outside and thereby to bring an inner side of this location tightly against the wearer's body. Such undergarment is disclosed, for example, in Japanese Laid-Open Patent Application Nos. Hei4-166150 and Hei4-289201.

However, attempts to bring the desired location of the undergarment overlying the liquid-absorbent core tightly against the wearer's body and thereby to avoid leakage of body fluids would disadvantageously result in causing the elastic elements to compress the wearer's waist over a wide range and often makes the undergarment less comfortable to wear. Surprisingly, it has been found that leakage of body fluids can be effectively avoided by bringing only a local area overlying the longitudinally opposite edges of the core, rather than the entire location overlying the core, closely against the wearer's body and thus reduction in the comfort of the undergarment can be alleviated.

Accordingly, a principal feature of the invention is the provision of a disposable absorbent undergarment of pants type in which elastic elements associated with the waist in a region adjacent each longitudinally opposite edge of the core are arranged with a relatively high density so that the fitting of said region to the wearer's skin may be at least partially improved.

According to the invention, there is provided a disposable absorbent undergarment of pants type comprising a liquid-permeable topsheet, a liquid-impermeable backsheets and a liquid-absorbent core disposed therebetween, the undergarment having a front region, a rear region and a crotch region extending therebetween, and a plurality of elastic elements extending around a waist portion and around a pair of leg-openings, respectively, characterised in that the core longitudinally extends into the front and rear regions and has front and rear edges spaced apart from each waist-opening edge of the front and rear regions, respectively, the elastic elements associated with the front region are arranged between the front edge of the core and the waist-opening edge of the front region and between the front edge of the core and the crotch region; the number

of the elastic elements arranged in a first area defined by respective depths or vertical widths of 10mm above and below the front edge of the core are greater than that of the elastic elements arranged in a second area of the front region excluding the first area; and an elongation stress of each of the elastic elements in the first area is lower than that of the elastic elements in the second area.

According to the present invention, there is also provided a disposable absorbent undergarment in which elastic elements associated with the rear region are arranged between the rear edge of the core and the waist-opening edge of the rear region and between the rear edge of the core and the crotch region, the number of the elastic elements arranged in a third area defined by respective depths or vertical widths of 10mm above and below the rear edge of the core being greater than that of the elastic elements arranged in a fourth area of the rear region excluding the third area, and an elongation stress of each of the elastic elements in the third area being lower than that of the elastic elements in the fourth area.

With the disposable absorbent undergarment constructed as described above, the location of the undergarment overlying the area defined by the front edge of the core and adjacent thereto fits well to the wearer's body without exerting a relatively high pressure, because the elastic elements associated with the front region are arranged in this area with a relatively high density, but with a relatively lower elongation stress.

The invention will be described by way of example with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view showing a diaper of pants type according to an embodiment of the invention as partially broken away; and  
 Fig. 2 is a sectional view taken along a line II-II in Fig. 1.

Referring to Fig. 1, a diaper comprises a liquid-permeable topsheet 2, a liquid-impermeable backsheet 3 and a liquid-absorbent core 4 disposed between these two sheets 2, 3 and further comprises a front region 5, a rear region 6 and a crotch region 7 extending between these two regions 5, 6 as viewed longitudinally of the diaper 1. The top- and backsheets 2, 3 are bonded together at their portions extending outward beyond a peripheral edge of the core 4 and the front and rear regions 5, 6 have their inner surfaces opposed to each other bonded together along their transversely opposite edges at intermittently provided adhesive spots 10 so as to define a waist-opening 11 and a pair of leg-openings 12 and thereby to form the diaper 1 as a whole in pants(booties)-shape. In the diaper 1, the core 4 longitudinally extends over the crotch region 7 into the front and rear regions 5, 6, and has a front edge 4A, a rear edge 4B and transversely opposite edges 4C. The diaper 1 is provided around at least the front region 5 with a first

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elastic member 15 and around each leg-opening with a second elastic member 16. The first and second elastic members 15, 16 are secured in extended conditions to an inner surface of at least one of the top- and backsheets 2, 3 so that a number of gathers may be formed around the waist and the legs as these elastic members 15, 16 contract.

Referring to Fig. 2, the core 4 has a thickness which is substantially uniform over the front region 5, but over an area of at least 10mm deep adjacent the front edge 4A, progressively reduced toward the front edge 4A. Such locally reduced thickness may be obtained either by reducing the core material progressively toward the front edge 4A or by compressing the core material at this area. The portions of the top- and backsheets 2, 3 extending outward beyond the front edge 4A are bonded together by means of hot melt adhesive (not shown) to form a waist-opening edge 22. The rear region 6 is also constructed in a manner substantially similar to that as shown by Fig. 2.

Referring again to Figs. 1 and 2, the first elastic member 15 comprises a group 17B<sub>3</sub> of elastic elements 15a extending along the opening edge 22, a group 17B<sub>1</sub> of elastic elements 15b extending adjacent the front edge 4A of the core 4 and a group 17B<sub>2</sub> of elastic elements 15c extending at a level lower than the group 17B<sub>1</sub> of elastic elements 15b. Each elastic element 15a of group 17B<sub>3</sub> is 0.5 to 3mm wide, 0.05 to 1.5mm thick and the number of the elastic elements 15a distributed over a depth or vertical width of 10mm from the opening edge 22 is less than two point three(2.3). Each elastic element 15b of the group 17B<sub>1</sub> is 0.1 to 1.5mm wide, 0.05 to 1.5mm thick and the number of the elastic elements 15b distributed over respective depths or vertical widths of 10mm above and below the front edge 4A is two point five (2.5). Each elastic element 15c of the group 17B<sub>2</sub> is 0.1 to 5mm wide, 0.05 to 1.5mm thick and the number of the elastic elements 15c distributed over a depth or vertical width of 10mm is two(2.0). The elastic elements 15b, 15c of the groups 17B<sub>1</sub> and 17B<sub>2</sub> intersecting the core 4 are bonded to the backsheet 3 so that they may be distributed on an outer surface of the core 4. The elastic elements 15a, 15b, 15c of the groups 17B<sub>3</sub>, 17B<sub>1</sub> and 17B<sub>2</sub> are secured to the backsheet 3 with a 50% elongation stress per 150mm of 5 to 50g and an elongation ratio of 1.1 to 2.5. The second elastic member 16 comprises a group 17A of elastic elements 16a. The elongation stress of each of the elastic elements 15b of the group 17B<sub>1</sub> is lower than that of each of the elastic elements 15a, 15c of the groups 17B<sub>3</sub>, 17B<sub>2</sub>.

With the diaper 1 constructed as described above, the core 4 closely fits the wearer's skin at the front edge 4A and an area adjacent thereto, since the elastic elements 15b of the group 17B<sub>1</sub> are densely arranged above and below the front edge 4A of the core 4. Consequently, even if a portion of discharged body fluids flows on an upper surface of the topsheet 2 without be-

ing absorbed by the core 4, such flow will be unable to pass through the area adjacent the front edge 4A and will be reliably prevented from leaking outward. In the diaper 1, the elastic elements 15a of the group 17B<sub>3</sub> transversely extend across the front and rear regions 5, 6 so that they are continuous from the front region 5 to the rear region 6. Furthermore, an area defined by the group 17B<sub>1</sub> including the elastic elements 15b will not exert a greater pressure against the center zone of the wearer's stomach and will therefore not reduce the comfort of the undergarment, compared with the groups 17B<sub>3</sub>, 17B<sub>2</sub> including the elastic elements 15a, 15c, since the elongation stress of each of the elastic elements 15b of the group 17B<sub>1</sub> is lower than that of each of the elastic elements 15a, 15c of the groups 17B<sub>3</sub>, 17B<sub>2</sub>. While the elastic elements 15b, 15c of the groups 17B<sub>1</sub>, 17B<sub>2</sub> are preferably arranged both on the front region 5 and on the rear region 6, it is also possible without departing from the scope of the invention to arrange them on any one of these front and rear regions, for example, depending on the wearer's particular body form.

The elastic elements 15b of the group 17B<sub>1</sub> may be replaced by one or more relatively wide ribbon-like elastic member(s) to improve the fitting of the core at its front edge 4A and area therearound to the wearer's skin. However, such replacement would be disadvantageous in that a desired air permeation between the interior and exterior of the diaper 1 will be significantly impeded.

In order to implement the invention, a nonwoven fabric or perforated plastic film may be used for the topsheet 2 and a plastic film such as polyethylene may be used for the backsheet 3. Fluff pulp alone or a mixture of fluff pulp and superabsorbent polymer powder may be molded by any well known technique into a shape required for the core 4. A material having a rubber-like elasticity such as rubber or plastic elastomer may be used for the first and second elastic members 15, 16.

With the undergarment of the invention, the undergarment reliably fits the wearer's body at the area adjacent the front edge of the core and can prevent body fluids from leaking beyond this edge without reducing its comfort to wear. Furthermore, the arrangement such that the thickness of the core adjacent the front and/or rear edge(s) thereof is progressively reduced toward the edge(s) is effective to reduce a difference in level generated between the core and the wearer's skin and thereby to improve the appearance of the undergarment whilst being worn. Even if such progressive decrease in the core thickness is obtained by compressing the core material, the densely arranged elastic elements allow such progressively thinned area to fit the wearer's body.

#### Claims -

1. A disposable absorbent undergarment of pants type comprising a liquid-permeable topsheet, a liquid-impermeable backsheet and a liquid-absorbent

core disposed therebetween, said undergarment having a front region, a rear region and a crotch region extending therebetween, and a plurality of elastic elements extending around said front and rear regions and around a pair of leg-openings, respectively, characterised in that:-

    said core longitudinally extends into said front and rear regions and has front and rear edges spaced apart from each waist-opening edge of said front and rear regions, respectively; 10  
    said elastic elements associated with said front region are arranged between the front edge of said core and the waist-opening edge of said front region and between the front edge of said core and said crotch region; 16  
    the number of said elastic elements arranged in a first area defined by respective depths or vertical widths of 10mm above and below the front edge of said core are greater than that of said elastic elements arranged in a second area of said front region excluding said first area; 20  
    and  
    an elongation stress of each of said elastic elements in said first area is lower than that of said elastic elements in said second area. 25

2. The undergarment according to claim 1, wherein, in an area of said core at least 10mm inward from the front edge of said core, said core has a thickness 30 progressively reduced toward said front edge.
3. The undergarment according to Claim 1 or 2, wherein elastic elements associated with said rear region are arranged between the rear edge of said core and the waist-opening edge of said rear region and between the rear edge of said core and said crotch region, the number of said elastic elements arranged in a third area defined by respective depths or vertical widths of 10mm above and below the rear edge of said core being greater than that of said elastic elements arranged in a fourth area of said rear region excluding said third area, and an elongation stress of each of said elastic elements in said third area being lower than that of said elastic elements in said fourth area. 40 46

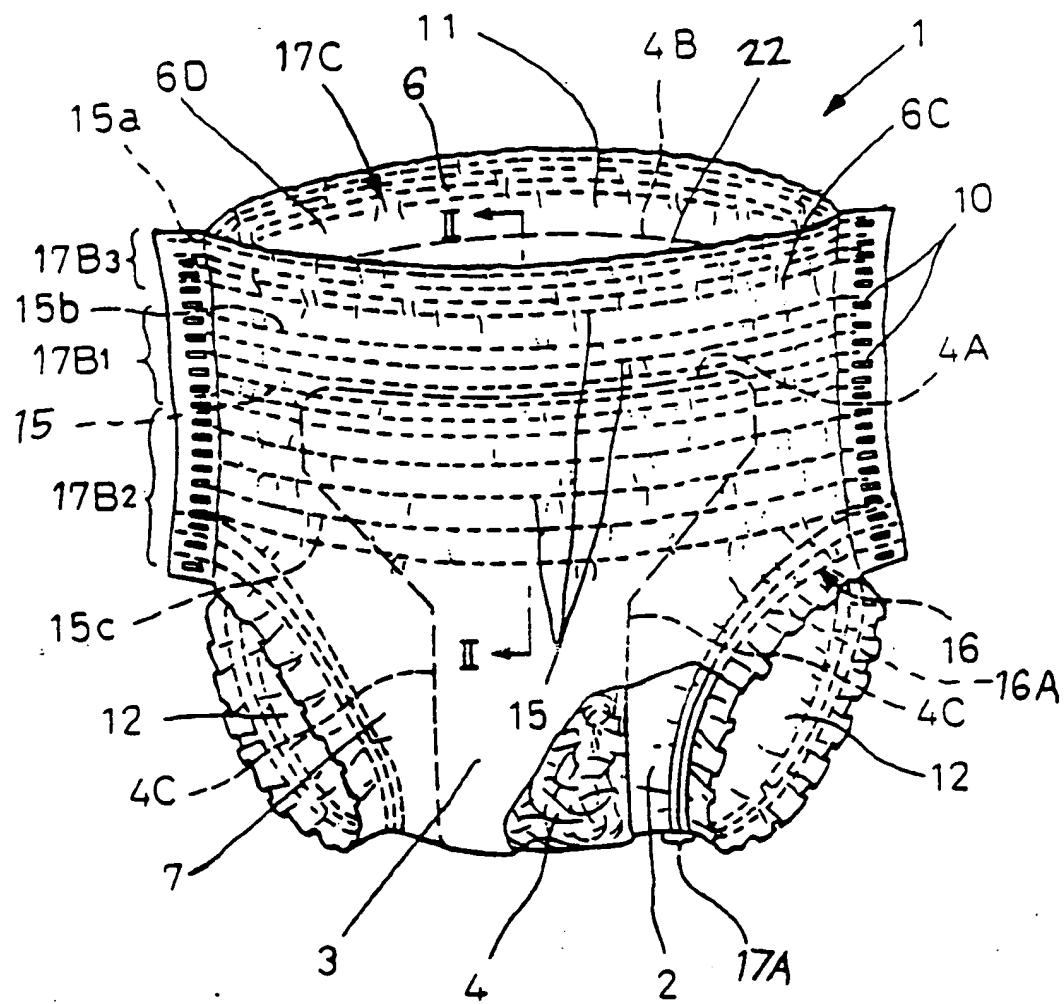
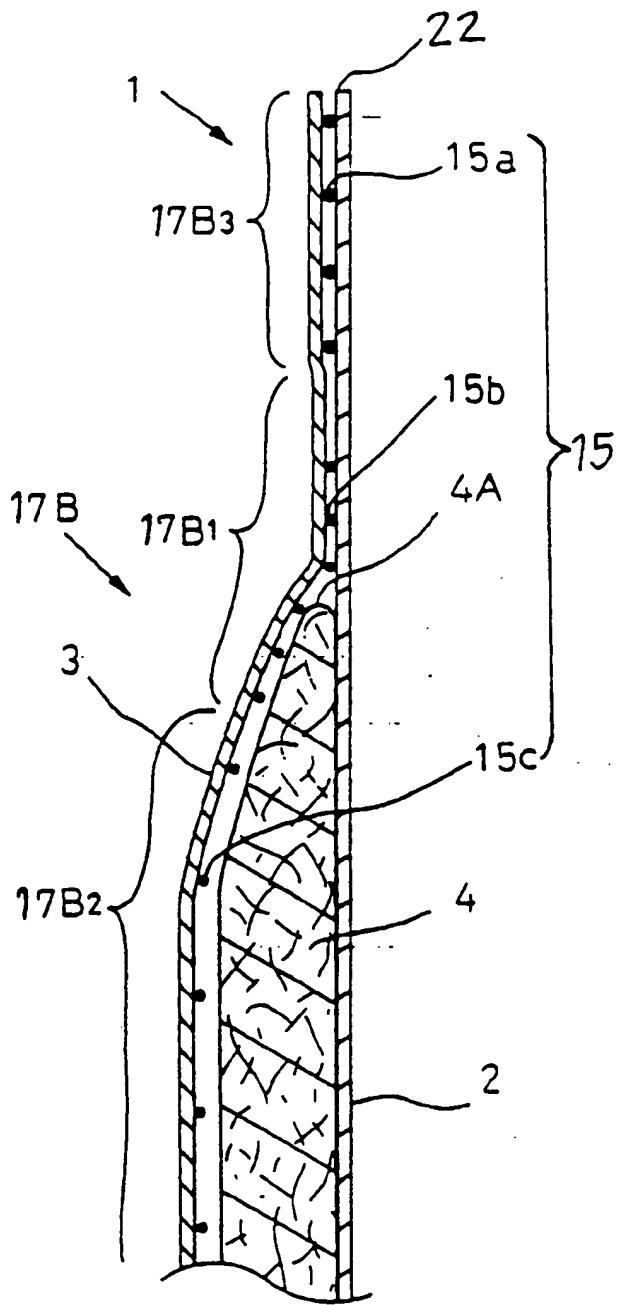


FIG. I

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**FIG.2**